



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/677,546	10/01/2003	Adam L. Cohen	P-US079-A-SC	9561

7590 02/10/2006  
Dennis R. Smalley  
Microfabrica Inc.  
7911 Haskell Avenue  
Van Nuys, CA 91406

EXAMINER

VAN, LUAN V

ART UNIT PAPER NUMBER

1753

DATE MAILED: 02/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/677,546

Applicant(s)

COHEN, ADAM L.

Examiner

Luan V. Van

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 25-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☒ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claim 1-24, drawn to a method, classified in class 205, subclass 118.
- II. Claims 26-29, drawn to an apparatus, classified in class 204, subclass 224R.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus can be used for electropolishing.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper, restriction for examination purposes as indicated is proper.

A telephone call was made to Applicant's representative, Mr. Dennis Smalley, on 1/13/06 to request an oral election to the above restriction requirement; Mr. Smalley elected Group I, claims 1-24.

Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

### ***Drawings***

Figures 1-3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 7, 9-12 and 17-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 7, the limitation of "formation of a desired pattern" lacks antecedent basis. It is unclear when this is formed.

Regarding claims 9 and 11, these claims appear to be duplicate claims. One of the claims should be modified or canceled. In claim 9, the phrase "is inactive" should be changed to -- is made inactive --.

Art Unit: 1753

Regarding claims 10 and 12, these claims appear to be duplicate claims. One of the claims should be modified or canceled. The claims are also in improper format, since they do not recite process steps. The limitation of "resolution" lacks antecedent basis. Claims 10 and 12 are unclear; claim 10 states that the resolution of a layer is better than that of a net area, while claim 12 states that the resolution is defined by the net area.

Regarding claim 17-22, the limitation of "electrochemical fabrication" lacks antecedent basis.

Regarding claim 22, the limitation of "planarization process" lacks antecedent basis.

It is suggested that the rejected pending claims be rewritten as suggested above to make the claims in definite format as required under 35 U.S.C. 112, second paragraph.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Art Unit: 1753

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-24 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-52 of copending Application No. 10677498 in view of Cohen '630. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

Regarding claims 1, 2, 4, 23 and 24 the copending application claims the following method:

A process for forming a multilayer three-dimensional structure, comprising: (a) forming a layer of at least one material on a substrate that may include one or more previously deposited layers of one or more materials; (b) repeating the forming operation of "(a)" one or more times to form at least one subsequent layer on at least one previously formed layer to build up a three-dimensional structure from a plurality layers; wherein the forming of at least one layer, comprises: supplying a substrate on which one or more successive depositions of one or more materials may have occurred; (2) supplying a multi-cell mask, wherein each cell is separated from other cells by a material, wherein the cells of the mask comprise independently controllable electrodes, and wherein a pattern of dielectric material extends beyond the cell electrodes for contacting the substrate and for forming electrochemical process pockets when such contact is made; (3) bringing the multi-cell mask and the substrate into contact such that electrochemical process pockets are formed having a desired registration with respect

Art Unit: 1753

to any previous depositions and providing a desired electrolyte solution such that the solution is provided within the electrochemical process pockets; and (4) applying a desired electrical activation to at least one desired cell electrode, to the substrate, and to any other desired electrode or electrodes, such that a desired material is selectively deposited onto the substrate (claim 1, 11 and 31).

The claims in the copending application differ from the instant claims in that the claims recite additional limitation such as selectively etching a material from the substrate to form at least one void and depositing a material into at least one void (claim 1), and applying a desired activation to one or more additional electrodes (claim 31).

The claims of the copending application read on the instant claims, since the copending application contains all the limitations of the instant claims, and since the instant claims recites "comprising", additional steps may be incorporated.

Furthermore, Cohen '630 teaches a microfabrication process by selectively depositing a structural metal and sacrificial metal layer (column 13 lines 23-39) on a planar substrate 2 (figure 11) using a multi-cell conformable mask 16 (figure 11). The sacrificial metal is subsequently removed to produce a multilayer structure. In addition, since the metal is selectively deposited in the desired location by activating between the electrode 10 (as the anode when metal is electroplated) and substrate 2 (as the cathode), no other electrodes are required to electroplate the structural or sacrificial metal.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method claims of the copending application by

Art Unit: 1753

omitting the etching step and/or activating other electrodes as taught by Cohen '630, because one having ordinary skill in the art would have recognized that selectively depositing a material onto a substrate does not require the substrate to be previously etched nor that other electrodes be activated as demonstrated by Cohen '630 (figure 11).

Regarding claim 3, the copending application claims at least a portion of the dielectric material that extends beyond the cell electrodes comprises a conformable material (claim 38).

Regarding claim 5, the copending application claims the formation of the three-dimensional structure comprises at least the deposition of two different materials during the formation of at least a portion of the plurality of layers (claim 22).

Regarding claim 6, the copending application claims a plurality of the cells of the multi-cell mask comprise an electrodeposable material that may be deposited during the applying operation (claim 18).

Regarding claim 7-8, the copending application claims the formation of a desired pattern of material on a given layer comprises a plurality of selective deposition operations using the multi-cell mask wherein at least a portion of the depositions utilize a cell whose deposition position is offset between at least two deposition operations (claims 4 and 52). Regarding claim 9 and 11, the copending application claims cell is made either inactive or active (claims 25-28).

Regarding claim 10 and 12, the structure of the copending application inherently has a resolution defined by a net area.



Regarding claim 13, the copending application claims at least a portion of the offsets of a cell result in locating the cell to a deposition position that is substantially in registration with a deposition position from a previous registration of the cell on the given layer (claim 1).

Regarding claim 14, the copending application claims at least a portion of the offsets of a cell result in locating the cell to a deposition position that does not substantially overlap a deposition position from a previous registration of the cell on the given layer (claim 4 and 52).

Regarding claim 15 and 16, the copending application defines the multi-cell mask having a plurality of shapes in the disclosure. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the shape of the cells as taught by Cohen '630, because it would be desirable to manufacture macroscopic parts having features with different sizes and thickness suited for the particular applications (column 1 lines 13-40).

Regarding claim 17, the copending application claims the operation of at least a portion of the cells of the multi-cell mask is tested by electroplating material using the mask and examining the resulting depositions (claim 5).

Regarding claim 18-21, the copending application claims an algorithm to test, identify and redress any faulty cells (claim 6).

Regarding claim 22, the copending application claims a planarization process (claim 20).

Claims 1-24 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-48 of copending Application No. 10434519 in view of McFarland et al.

Regarding claims 1-24, the copending application claims the following method:

A process for forming a multilayer three-dimensional structure, comprising: (a) forming a layer of at least one material on a substrate that may include one or more previously deposited layers of one or more materials; (b) repeating the forming operation of "(a)" one or more times to form at least one subsequent layer on at least one previously formed layer to build up a three-dimensional structure from a plurality layers; wherein the forming of at least one layer, comprises: supplying a substrate on which one or more successive depositions of one or more materials may have occurred; (2) supplying a multi-cell mask, wherein each cell is separated from other cells by a material, wherein the cells of the mask comprise independently controllable electrodes, and wherein a pattern of dielectric material extends beyond the cell electrodes for contacting the substrate and for forming electrochemical process pockets when such contact is made; (3) bringing the multi-cell mask and the substrate into contact such that electrochemical process pockets are formed having a desired registration with respect to any previous depositions and providing a desired electrolyte solution such that the solution is provided within the electrochemical process pockets; and (4) applying a desired electrical activation to at least one desired cell electrode, to the substrate, and

to any other desired electrode or electrodes, such that a desired material is selectively deposited onto the substrate.

In addition, the copending application claims the steps of depositing structural materials and sacrificial materials (claim 25 and 28); planarizing the surface of the deposited material (claim 15 and 28); using a conformable contact mask (claim 47). The mask of the copending application is a multi-cell mask, since pockets or cells are created by the masking material on the mask.

The difference between the claims in the copending application and the instant claims is that the claims do not explicitly teach the cells of the mask comprise independently controllable electrodes.

McFarland et al. teach a method for electrochemically depositing materials on the substrate using an array of electrodes, wherein the electric potential of each electrode can be independently varied (column 3 lines 36-65). McFarland et al. teach that the method provides a potential masking method which generates spatially varying electric, magnetic, and/or chemical potentials across a substrate (column 3 lines 1-5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of the copending application by using a mask having independently controllable electrodes as taught by McFarland et al., because having independently controllable electrodes allows the electric potential to be varied, and thus allows the thickness to be controlled at different locations.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 1-24 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-50 of copending Application No. 10271574 in view of McFarland et al.

Regarding claims 1-24, the copending application claims the following method:

A process for forming a multilayer three-dimensional structure, comprising: (a) forming a layer of at least one material on a substrate that may include one or more previously deposited layers of one or more materials; (b) repeating the forming operation of "(a)" one or more times to form at least one subsequent layer on at least one previously formed layer to build up a three-dimensional structure from a plurality layers; wherein the forming of at least one layer, comprises: supplying a substrate on which one or more successive depositions of one or more materials may have occurred; (2) supplying a multi-cell mask, wherein each cell is separated from other cells by a material, wherein the cells of the mask comprise independently controllable electrodes, and wherein a pattern of dielectric material extends beyond the cell electrodes for contacting the substrate and for forming electrochemical process pockets when such contact is made; (3) bringing the multi-cell mask and the substrate into contact such that electrochemical process pockets are formed having a desired registration with respect to any previous depositions and providing a desired electrolyte solution such that the solution is provided within the electrochemical process pockets; and (4) applying a desired electrical activation to at least one desired cell electrode, to the substrate, and

Art Unit: 1753

to any other desired electrode or electrodes, such that a desired material is selectively deposited onto the substrate.

In addition, the copending application claims the steps of depositing structural materials and sacrificial materials (claim 21); planarizing the surface of the deposited material (claim 22); using a conformable contact mask (claim 1); varying the temperature of the conformable mask (claim 4), which can inherently create bubbles to inhibit etching or deposition; and detecting a first electrical parameter whose value depends on the location of a deposit within the opening (claim 28-33). The mask of the copending application is a multi-cell mask, since pockets or cells are created by the masking material on the mask.

The claims in the copending application and the instant claims differ in that the copending claims not explicitly teach the cells of the mask comprise independently controllable electrodes.

McFarland et al. teach a method for electrochemically depositing materials on the substrate using an array of electrodes, wherein the electric potential of each electrode can be independently varied (column 3 lines 36-65). McFarland et al. teach that the method provides a potential masking method which generates spatially varying electric, magnetic, and/or chemical potentials across a substrate (column 3 lines 1-5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of the copending application by using a mask having independently controllable electrodes as taught by McFarland et al.,

Art Unit: 1753

because having independently controllable electrodes allows the electric potential to be varied, and thus allows the thickness to be controlled at different locations.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 1-24 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-20 of copending Application No. 10724515 in view of McFarland et al.

Regarding claims 1-24, the copending application claims the following method:

A process for forming a multilayer three-dimensional structure, comprising: (a) forming a layer of at least one material on a substrate that may include one or more previously deposited layers of one or more materials; (b) repeating the forming operation of "(a)" one or more times to form at least one subsequent layer on at least one previously formed layer to build up a three-dimensional structure from a plurality layers; wherein the forming of at least one layer, comprises: supplying a substrate on which one or more successive depositions of one or more materials may have occurred; (2) supplying a multi-cell mask, wherein each cell is separated from other cells by a material, wherein the cells of the mask comprise independently controllable electrodes, and wherein a pattern of dielectric material extends beyond the cell electrodes for contacting the substrate and for forming electrochemical process pockets when such contact is made; (3) bringing the multi-cell mask and the substrate into contact such that

Art Unit: 1753

electrochemical process pockets are formed having a desired registration with respect to any previous depositions and providing a desired electrolyte solution such that the solution is provided within the electrochemical process pockets; and (4) applying a desired electrical activation to at least one desired cell electrode, to the substrate, and to any other desired electrode or electrodes, such that a desired material is selectively deposited onto the substrate.

In addition, the copending application claims the steps of planarizing the surface of the deposited material (claim 9); using a contact mask (claim 1). The mask of the copending application is a multi-cell mask, since pockets or cells are created by the masking material on the mask.

The difference between the claims in the copending application and the instant claims is that the copending claims do not explicitly teach the cells of the mask comprise independently controllable electrodes.

McFarland et al. teach a method for electrochemically depositing materials on the substrate using an array of electrodes, wherein the electric potential of each electrode can be independently varied (column 3 lines 36-65). McFarland et al. teach that the method provides a potential masking method which generates spatially varying electric, magnetic, and/or chemical potentials across a substrate (column 3 lines 1-5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of the copending application by using a mask having independently controllable electrodes as taught by McFarland et al.,

Art Unit: 1753

because having independently controllable electrodes allows the electric potential to be varied, and thus allows the thickness to be controlled at different locations.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to the applicant's disclosure. Cohen '369, and Cohen '742 teach forming a three-dimensional structure using a conformable mask.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan V. Van whose telephone number is 571-272-8521. The examiner can normally be reached on M-F 9:30-6:00.

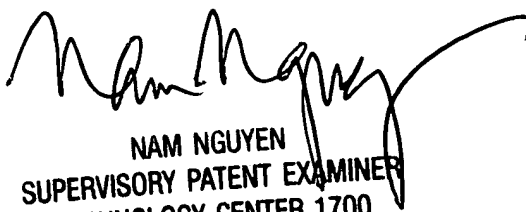
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



Art Unit: 1753

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LWV  
1/31/06



NAM NGUYEN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700